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[Applicant]
Code: 000004341
Name: Nippon Yushi K.K.
Address: 20-3 4-chome, Ebisu, Shibuya-ku, Tokyo, Japan

[Applicant]
Code: 000232922
Name: Nichiyu Giken Kogyo K.K.
Address: 21-2 Matoba-Shinmachi, Kawagoe-shi, Saitama, Japan

[Inventor]
Name: Kinnosuke Hino
Address: c/o Nichiban Co. Ftd., 2-3-3 Sekiguchi, Bunkyo-ku, Tokyo, Japan

[Inventor]
Name: Mikio Nakano
Address: 4-345-3 Tsukagoe, Ko-ku, Kawasaki-shi, Kanagawa, Japan

[Inventor]
Name: Shunji Tsumura
Address: 2-14-1 Kanatani Yokosuka-shi, Kanagawa, Japan

[Inventor]
Name: Hiromichi Mizusawa
Address: 405 Arc Palace No.35 4-28 Fujimi, Tsurugashima-shi, Saitama, Japan

[Inventor]
Name: Daisuke Harumoto
Address: Park Side City No. 206 11-7 3-chome Izumicho, Sakado-shi, Saitama, Japan

[Assigned Representative]

[Patent Attorney]

[Object]

This invention offers a water detection label which is clearly discolored when exposed to water. It will not return to its original color after discoloring even when it is dried. It will not be discolored by exposure to high humidity, condensation, or attachment of moisture from the surface.

[Means of Solution]

The water detection label in this invention has the following construction. The coloring layer 2 is set up on one side of a water-permeable film 1. This coloring layer 2 consists of 0.001 to 5 weight % of a water-soluble dye and ink vehicle. This ink vehicle is a solvent solution of at least one kind of resin such as cellulose, acryl, polyester, polyamide, polyacetal, silicon, polyurethane, epoxy, or petroleum.

[Sphere of patent request]

[Claim 1]

Claim 1 is concerning a water detection label with the following construction. A coloring layer is set up on one side of a water-permeable film. This coloring layer consists of 0.001 to 5 weight % of a water-soluble dye and ink vehicle. This ink vehicle is a solvent solution of at least one kind of resin such as cellulose, acryl, polyester, polyamide, polyacetal, silicon, polyurethane, epoxy, or petroleum.

[Claim 2]

Claim 2 is concerning a water detection label with the following construction. A coloring layer is set up on one side of a water-permeable film. This coloring layer consists of 0.001 to 5 weight % of a water-soluble dye and ink vehicle. A transparent waterproof layer is set upon the surface of this label.

[Claim 3]

Claim 3 is concerning the water detection label in claim 1 or 2 where the coloring layer includes 70 wt.% or less of opaque powder.

[Detailed explanation of the invention]

[0001]

[Technological Field of This Invention]

This invention is regarding a water detection label for detecting water leaks.

[0002]

[Prior Art]

It is necessary to detect water leaks due to tank or pipe damage in the early stages of construction because leaks will damage the water repellent treatment. Water leaks are generally detected visually. However, small leaks are sometimes overlooked, and intermittent leaks cannot be detected after the water dries. Because of this, a means for detecting water leaks easily without relying on vision has been demanded. Former methods for detecting water leaks include, for example, indicators described in Japan patent No. H 5-72194, No. H 6-202560, and No. H 7-55788, which contain a substance which changes color by reacting with water.

[0003]

[Problems that this invention tries to solve]

However, these indicators are not so clear because the discolored part is too small even if they detect water. It is also impossible to tell the difference between water leaks and condensation when they are used in high humidity environments. It is sometimes impossible to detect water leaks using these devices.

[0004] This invention was invented to solve the above problems. The object of this invention is to a offer water detection label which is clearly discolored when it is exposed to water. It does not return to its original color after discoloring even when it is dried. It will not be discolored by condensation on its surface.

[0005]

[Means to solve the problems]

The water detection label in this invention which was made in order to attain the above object has the following construction. As shown in figure 1, a coloring layer 2 is set up on one side of a water-permeable film 1. This coloring layer 2 consists of 0.001 to 5 weight % of a water-soluble dye and ink vehicle. This ink vehicle is a solvent solution of at least one kind of resin such as cellulose, acryl, polyester, polyamide, polyacetal, silicon, polyurethane, epoxy, or petroleum.

[0006] The solvent should be at least one of the following: aromatic hydrogen carbides like benzene, toluene, or xylene; saturated hydrogen carbides like hexane, cyclohexane, or octane; ketones like acetone, methylethylketone, or cyclohexanone; hydrogen carbide halides like chloroform or trichloroethane; petroleum solvents of mineral spirits like petroleum ether. This ink vehicle may be one which is readily available on the current market.

[0007] If the amount of water-soluble dye is less than 0.001 wt.%, color saturation after discoloring of the coloring layer 2 is insufficient. On the other hand, if it exceeds 5 wt.%, the initial is too dark, and it will be difficult to detect since the contrast before and after discoloring is small.

[0008] Thew water detection label in this invention which was made to attain the above object has the following construction. A coloring layer 2 is set up on one side of a water-permeable film 1. This coloring layer 2 consists of 0.001 to 5 weight % of a water-soluble dye and ink vehicle. A transparent waterproof layer 3 is set upon the surface of this label. This transparent waterproof layer 3 improves resistance to discoloration due to condensation.

[0009] The coloring layer 2 should include 70 wt.% or less opaque powder. If the amount of opaque powder exceeds 70wt.%, adhesion between the water permeable film 1 and the coloring layer 2 will be poor.

[0010] Anything which can absorb and transmits moisture quickly and also has sufficient wet strength can be used for the water permeable film 1. For example, there are paper and nonwoven fabrics.

[0011] The water-soluble dye should be at least one kind selected from the following: acid dyes such as kayanol red NBR, brilliant scarlet 3B, acid fast orange SG, amaranth, acid Rhodamine B, eosin G, acid milling red RS, alizarin direct blue AGG, indigo carmine blue G, acid milling cyanine 5R; basic dyes such as aizen cation red 7BNH, cation red 6B, cation pink FG, crystal violet, methylene blue B; direct dyes such as kayanol light red F5B, direct fast scarlet 4BS, benzo perpurine 4B, direct fast orange S, direct rhodurine red B, chloranch fast red 6BFF, serious red 4B, serious spla violet RF, seriour spla violet BF, direct sky blue 5B; acid medium dyes such as chromium orange A, chromium orange GR, chromium red B, chromium brilliant red B, chromium brilliant violet, chromium brown PG; reactive dyes such as Sumifix brilliant red G special, reacton red 2B-F, prosion rubin BS, cibachron violet F2R-A, prosion brilliant blue RS; food coloring such as red No. 2, red No. 3, red No. 4, red No. 102, red No. 103, red No. 104, red No. 105, and red No. 106.

[0012] The transparent waterproof layer 3 should be selected from the following films: polyethylene, polystyrene, polypropylene, polyvinyl chloride, polyvinyl fluoride, and cellophane, varnish of synthetic rubber, silicon resin, polyamide resin, cellulose resin, acryl resin, and epoxy resin.

[0013] The opaque powder above is for opaque the color of the water-soluble dye before discoloring, for improving dye after changing color, and maintaining the color after discoloring. It should be one of the following: magnesium carbonate, calcium carbonate, barium carbonate, magnesium hydroxide, magnesium oxide, calcium oxide, titanium oxide, silicic acid, magnesium silicate, aluminum silicate, acid clay, kaolin, bentonite, and sericite.

[0014] The coloring 2 may contain an extender, thickener, dispersant, color adjustment agent, stabilizer, antioxidant, etc., as long as they do not interfere with coloring.

[0015] In addition, in order to attach the label in this invention to the site of use, as shown in figure 3, an adhesive layer 4 is provided on the back surface and edges, etc., of the water permeable film 1. A release paper 5 is provided to protect the adhesive layer 4. The label can be applied by removing the release paper 5 when the water detection label is used.

[0016] This moisture detection label is manufactured by the following method. First, ink components such as water-soluble dye, opaque powder, and the ink vehicle are dispersed and kneaded using a ball mill, triple roll, mixer, agate machine, sand mill, or dispersing machine, and they are turned into ink. This ink is applied on a water-permeable film 1 by methods such as screen printing, gravure printing, offset printing, coating, or spraying to form a coloring layer 2. This comprises the moisture detection label. The transparent waterproof layer 3 is formed on the water detection label by the following process. The waterproof layer component can be a film, dry laminate, extruded laminate, or hot laminate used for laminate processing. When the water proof layer is a varnish, it can be applied by printing, spraying, brushing, roll coating, knife coating, or air-knife coating, for example.

[0017] The moisture detection label is placed on a tank or water supply pipe. When there is a water leak, moisture permeates the water-permeable film 1. When moisture reaches the coloring layer 2, moisture penetrates the coloring layer 2. The water-soluble dye is dissolved, and the water-permeable film 1 and opaque powder are dyed. Accordingly, since the dyed condition is irreversible, the discoloration will not go away. In addition, even if moisture is deposited on the surface by condensation, etc., the label will not be discolored since the moisture does not penetrate the coloring layer 2.

[0018]
[Effects of this invention]

The water detection label in this invention changes its color clearly when it is exposed to moisture. When it is dried, it will not return to its original color. Not only that, it will not change its color even if moisture is deposited on its surface. Because of this, damage or breakage of water-proof sites such as tunnels or other construction, water-leak sites such as tanks or water supply pipes can be detected easily and surely.

[0019]
[Examples of practice]

In the following, examples of practice of this invention are going to be explained in more detail. Examples of practice 1 to 13 are examples which show water detection labels where the coloring layer in this invention is set up. Examples of comparison 1 to 3 are examples of labels which do not conform to this invention.

[0020]
Example of practice 1

1 wt.% of food coloring red No. 4 (manufactured by Sanei Kagaku Kogyo)and 9 wt.% of ethyl cellulose (Ethocel: manufactured by Dow Chemical Co.) were dissolved in 90 wt.% xylene. This was kneaded in an agate machine to make ink. This ink was screen-printed on filter paper (No. 4: manufactured by Advantec Toyo), and a light red water detection label was produced.

[0021] Next, this label was tested. 0.01 ml of water was dropped on the back surface of this label, and moisture was deposited. After the change in color and the discolored area were measured, it was dried for 24 hours at 50°C, and the change in color was observed. Next, 10 ml of water was dropped on the surface of the label, and moisture was deposited, and the change in color was observed. These results are shown in table 1.

[0022]

table 1

		Color before exposure	Back side			Top side		
			Color after exposure	Dis-colored area (cm^2)	Color after drying	Color after exposure	Dis-colored area (cm^2)	Color after drying
Examples of practice	1	Pink	Red	1.5	Red	Pink	-	-
	2	white	Red	1.5	Red	white	-	-
	3	white	Pink	1.5	Pink	white	-	-
	4	Peach white	red	1.5	red	Peach white	-	-
	5	white	Red	1.5	Red	white	-	-
	6	white	Red	1.5	Red	white	-	-
	7	white	Red	1.5	Red	white	-	-
	8	white	Red	1.5	Red	white	-	-
	9	white	Red	1.5	Red	white	-	-
	10	white	Red	1.5	Red	white	-	-
	11	white	Red	1.5	Red	white	-	-
	12	white	Red	1.5	Red	white	-	-
	13	white	Red	1.5	Red	white	-	-
Examples of comparison	1	white	Grey	2.5	White	Grey	2.5	White
	2	white	Red	1.5	Red	Red	1.5	red
	3	red	red	-	-	red	-	-

[0023] As shown in table 1, when moisture was applied to the back surface of the water detection label, it changed color clearly over a large area. When it was dried, it did not return to its original color. In addition, when moisture was applied to its surface, it did not change its color even after it was left for 1 week.

[0024]

Example of practice 2

0.1 wt.% of food color No. 4 (manufactured by Sanei Kagaku Kogyo), 30 wt.% of silicic acid (AEROSIF 380: manufactured by Nippon Aerosil) as opaque powder, and 6 wt.% of ethyl cellulose resin (Ethocel: manufactured by Dow Chemical Co.) were dissolved in 63.9 wt.% of xylene. This was kneaded in an agate machine to make ink. This ink was screen-printed on filter paper (No. 4: manufactured by Advantec Toyo), and a white water detection label was produced.

[0025] This label was tested as in example of practice 1, and the results are shown in table 1. As shown in the table, when moisture was applied to the back surface of the water detection label, it changed color clearly over a large area. When it dried, it did not return to its original color. In addition, when moisture was applied to its surface, it did not change its color even after it was left for 1 week.

[0026] Example of practice 3

0.001 wt.% of food color No. 4 (manufactured by Sanei Kagaku Kogyo), 30 wt.% of silicic acid (AEROSIF 380: manufactured by Nippon Aerosil), and 6 wt.% of ethyl cellulose resin (Ethocel: manufactured by Dow Chemical Co.) were dissolved in 63.999 wt.% xylene. This was kneaded in an agate machine to make ink. This ink was screen-printed on filter paper (No. 4: manufactured by Advantec Toyo), and a white water detection label color was produced.

[0027] This label was tested as in example of practice 1, and the results are shown in table 1. As shown in the table, when moisture was applied to the back surface of the water detection label, it changed color clearly over a large area. When it dried, it did not return to its original color. In addition, when moisture was applied to its surface, it did not change its color even after it was left for 1 week.

[0028] Example of practice 4

5 wt.% of food color No. 4 (manufactured by Sanei Kagaku Kogyo) as water-soluble dye, 30 wt.% of silicic acid (AEROSIF 380: manufactured by Nippon Aerosil) as opaque property powder, and 6 wt.% of resin of ethyl cellulose (Ethocel: manufactured by Dow Chemical Co.) as ink vehicle were dissolved in 59 wt.% of solvent of xylene. This was kneaded in an agate machine to make ink. This ink was screen-printed on filter paper (No. 4: manufactured by Advantec Toyo), and a white water detection label color was produced.

[0029] This label was tested as in example of practice 1, and the results are shown in table 1. As shown in the table, when moisture was applied to the back surface of the water detection label, it changed color clearly over a large area. When it dried, it did not return to its original color. In addition, when moisture was applied to its surface, it did not change its color even after it was left for 1 week.

[0030] Example of practice 5

Except that 0.1 wt.% of basic Aizen cation red 7BNH (manufactured by Hodogawa Kagaku Kogyo) was used as the water-soluble dye, the same procedure as example of practice 2 was followed, and a white water detection label was manufactured.

[0031] This label was tested as in example of practice 1, and the results are shown in table 1. As shown in the table, when moisture was applied to the back surface of the water detection label, it changed color clearly over a large area. When it dried, it did not return to its original color. In addition, when moisture was applied to its surface, it did not change its color even after it was left for 1 week.

[0032] Example of practice 6

Except that 0.1 wt.% of acidic dye of Kayanol red NBR (manufactured by Nippon Kayaku) was used as the water-soluble dye, the same procedure as example of practice 2 was followed, and a white water detection label color was manufactured.

[0033] This label was tested as in example of practice 1, and the results are shown in table 1. As shown in the table, when moisture was applied to the back surface of the water detection label, it changed color clearly over a large area. When it dried, it did not return to its original color. In addition, when moisture was applied to its surface, it did not change its color even after it was left for 1 week.

[0034] Example of practice 7

Except that 0.1 wt.% of direct dye of Kayanol light red F5B (manufactured by Nippon Kayaku) was used as the water-soluble dye, the same procedure as example of practice 2 was followed, and a white water detection label was manufactured.

[0035] This label was tested as in example of practice 1, and the results are shown in table 1. As shown in the table, when moisture was applied to the back surface of the water detection label, it changed color clearly over a large area. When it dried, it did not return to its original color. In addition, when moisture was applied to its surface, it did not change its color even after it was left for 1 week.

[0036] Example of practice 8

Except that 0.1 wt.% of reactive dye of Sumifix brilliant red G special (manufactured by Sumitomo Kagaku Kogyo) was used as the water-soluble dye, the same procedure as example of practice 2 was followed, and a white water detection label was manufactured.

[0037] This label was tested as in example of practice 1, and the results are shown in table 1. As shown in the table, when moisture was applied to the back surface of the water detection label, it changed color clearly over a large area. When it dried, it did not return to its original color. In addition, when moisture was applied to its surface, it did not change its color even after it was left for 1 week.

[0038] Example of practice 9

Except that 69.9 wt.% of ink medium (PAS-800 medium: manufactured by Jujo Kako) was used as the ink vehicle, the same procedure as example of practice 2 was followed, and a white water detection label was manufactured.

[0039] This label was tested as in example of practice 1, and the results are shown in table 1. As shown in the table, when moisture was applied to the back surface of the water detection label, it changed color clearly over a large area. When it dried, it did not return to its original color. In addition, when moisture was applied to its surface, it did not change its color even after it was left for 1 week.

[0040] Example of practice 10

Except that 69.9 wt.% of ink medium currently on the market (Tetron 900 medium: manufactured by Jujo Kako) was used as the ink vehicle, the same procedure as example of practice 2 was followed, and a white water detection label was manufactured.

[0041] This label was tested as in example of practice 1, and the results are shown in table 1. As shown in the table, when moisture was applied to the back surface of the water detection label, it changed color clearly over a large area. When it dried, it did not return to its original color. In addition, when moisture was applied to its surface, it did not change its color even after it was left for 1 week.

[0042] Example of practice 11

Except that 20 wt. % of titanium oxide as opaque powder and 7 wt.% of ethyl cellulose resin (Ethocel: manufactured by Dow Chemical) as the ink vehicle were

dissolved in 72.9 wt.% of xylene, the same procedure as example of practice 2 was followed, and a white water detection label was manufactured.
[0043] This label was tested as in example of practice 1, and the results are shown in table 1. As shown in the table, when moisture was applied to the back surface of the water detection label, it changed color clearly over a large area. When it dried, it did not return to its original color. In addition, when moisture was applied to its surface, it did not change its color even after it was left for 1 week.

[0044] Example of practice 12

Except that 10 wt. % of calcium carbonate as opaque powder and 8 wt.% of ethyl cellulose resin (Ethocel: manufactured by Dow Chemical) as the ink vehicle were dissolved in 81.9 wt.% xylene, the same procedure as example of practice 2 was followed, and a white water detection label was manufactured.
[0045] This label was tested as in example of practice 1, and the results are shown in table 1. As shown in the table, when moisture was applied to the back surface of the water detection label, it changed color clearly over a large area. When it dried, it did not return to its original color. In addition, when moisture was applied to its surface, it did not change its color even after it was left for 1 week.

[0046] Example of practice 13

A polyvinyl fluoride film (Tedlar: manufactured by Dupont; thickness is 25 μm) was dry-laminated on the surface of the water detection label manufactured in example of practice 2, and a water detection label with a transparent waterproof layer was acquired.
[0047] This label was tested as in example of practice 1, and the results are shown in table 1. As shown in the table, when moisture was applied to the back surface of the water detection label, it changed color clearly over a large area. When it dried, it did not return to its original color. In addition, when moisture was applied to its surface, it did not change its color even after it was left for 1 week.

[0048] Example of comparison 1

0.01 ml of water was dropped on each side of filter paper (No. 4: manufactured by Advantec Toyo), and moisture was deposited. After the change in color and area of discolored sites were measured, it was left for 10 minutes, and the change in color was observed. The results are shown in table 1. As shown in the table, large areas on both sides were discolored when moisture was deposited. When dried, they returned to their original color right away.

[0049] Example of comparison 2

2 wt. % of food color red No. 4 (manufactured by Sanei Kagaku Kogyo) and 98 wt. % of silicic acid (AEROSIF 380: manufactured by Nippon Aerosil) were directly applied on filter paper (No. 4: manufactured by Advantec Toyo), and a white water detection label was produced.
[0050] 0.01 ml of water was dropped on the back and front surfaces of this label, and moisture was deposited. After the change in color and discolored areas were measured, it was dried for 24 hours at 50°C, and the change in color was observed. The results are shown in table 1. As shown in the table, when moisture was deposited on the back

surface of the water detection label, the discolored area was large. When dried, it did not return to its original color. When moisture was deposited on its surface, a large area was discolored. Since the dye dyed the filter paper, it did not return to its original color as it was dried.

[0051] Example of comparison 3

6 wt.% of food color No. 4 (manufactured by Sanei Kagaku Kogyo) and 9 wt.% of ethyl cellulose resin (Ethocel: manufactured by Dow Chemical Co.) were dissolved in 85 wt.% xylene. This was kneaded in an agate machine to make ink. This ink was screen-printed on filter paper (No. 4: manufactured by Advantec Toyo), and a red water detection label was produced.

[0052] This label was tested as in example of practice 1, and the results are shown in table 1. As shown in the table, when moisture was deposited from either surface, discoloration was not detected.

[Simple explanation of figures]

Figure 1: section of one example of practice of the water detection label in this invention.

Figure 2: section of another example of practice of the water detection label in this invention.

Figure 3: section of another example of practice of the water detection label in this invention.

[Explanation of symbols]

1: water permeable film
2: coloring layer
3: transparent waterproof layer
4: adhesive layer
5: release paper

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(71)【出願人】

【識別番号】０００００４３４１

【氏名又は名称】日本油脂株式会社

【住所又は居所】東京都渋谷区恵比寿四丁目２０番３号

(71)【出願人】

【識別番号】０００２３２９２２

【氏名又は名称】日油技研工業株式会社

【住所又は居所】埼玉県川越市的場新町２１番地２

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(71) [Applicant]

[Applicant Code] 000004341

[Name] NOF CORPORATION (DB 69-055-2575)

[Address] Tokyo Shibuya-ku Ebisu 4-20-3

(71) [Applicant]

[Applicant Code] 000232922

[Name] DAY OIL ENGINEERING AND RESEARCH INDUSTRY KK

[Address] Saitama Prefecture Kawagoe City Matoba Shinmachi

(72)【発明者】

【氏名】中野　幹夫

【住所又は居所】神奈川県川崎市幸区塚越４－３４５－３

(72)【発明者】

【氏名】津村　俊二

【住所又は居所】神奈川県横須賀市金谷２－１４－１

(72)【発明者】

【氏名】水沢　弘道

【住所又は居所】埼玉県鶴ケ島市富士見四丁目二十八番３５号アークパレス４０５

(72)【発明者】

【氏名】春本　大介

【住所又は居所】埼玉県坂戸市泉町３丁目１１－７パークサイドシティ２０６号

(74)【代理人】

【弁理士】

(57)【要約】

【課題】　水分を検知すると明瞭に変色し、変色後は乾燥しても元の色に戻らず、湿度の高い環境で使用しても表面からの水分の付着や結露により変色することがない水分検知ラベルを提供する。

【解決手段】　水分検知ラベルは、透水性フィルム１の片面に発色層２が設けられ、発色層２が水溶性染料０．００１～５重量%およびインキビヒクルからなり、該インキビヒクルがセルロース系樹脂、アクリル系樹脂、ポリエステル系樹脂、ポリアミド系樹脂、ポリアセタール系樹脂、シリコーン系樹脂、ポリウレタン系樹脂、エポキシ系樹脂、石油系樹脂の中から選ばれる少なくとも一種類の樹脂を溶剤に溶解したものである。

(72) [Inventor]

[Name] Nakano　Mikio

[Address] Kanagawa Prefecture Kawasaki City Saiwai-ku Tsukagoshi 4 - 345 - 3

(72) [Inventor]

[Name] Tsumura　Shunji

[Address] Kanagawa Prefecture Yokosuka City Kanetani 2 - 14 - 1

(72) [Inventor]

[Name] Mizusawa　Hiromichi

[Address] Saitama Prefecture crane island city Fujimi 4-Chome 2 hobby 35 number arc palace 405

(72) [Inventor]

[Name] Harumoto　Daisuke

[Address] Saitama Prefecture Sakado City Izumi-cho 3-Chome 11 - 7 park side city 206 number

(74) [Attorney(s) Representing All Applicants]

[Patent Attorney]

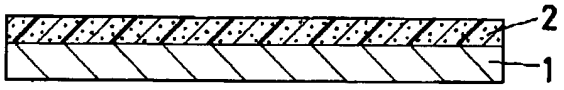
(57) [Abstract]

[Problem] When water is detected, it changes color clearly, after colorchange even when drying, using with environment where humidity is highnot to return to original color, it offers water detection labelwhich does not have fact that it changes color with depositand dew condensation of water from surface.

[Means of Solution] As for water detection label, it can provide coloration layer 2 in theone surface of water permeability film 1, coloration layer 2 consists of water soluble dye 0.001 to 5 weight% and ink vehicle, the said ink vehicle cellulosic resin, acrylic resin, polyester resin, polyamide resin and polyacetal resin ,is something which melts resin of at least one kind which are chosen fromthe midst of silicone resin, polyurethane resin, epoxy resin and petroleum type resin in

thesolvent.

図 1



【特許請求の範囲】

【請求項１】　透水性フィルムの片面に発色層が設けられ、該発色層が水溶性染料０．００１～５重量%およびインキビヒクルからなり、該インキビヒクルがセルロース系樹脂、アクリル系樹脂、ポリエステル系樹脂、ポリアミド系樹脂、シリコーン系樹脂、ポリアセタール系樹脂、ポリウレタン系樹脂、エポキシ系樹脂、石油系樹脂の中から選ばれる少なくとも一種類の樹脂を溶剤に溶解したものであることを特徴とする水分検知ラベル。

【請求項２】　透水性フィルムの片面に発色層が設けられ、該発色層が水溶性染料０．００１～５重量%およびインキビヒクルからなり、表面に透明防水層が設けられていることを特徴とする水分検知ラベル。

【請求項３】　前記発色層が隠蔽性粉体を７０重量%以下含有することを特徴とする請求項１または請求項２に記載の水分検知ラベル。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、水の漏洩を検知するための水分検知ラベルに関するものである。

【０００２】

【従来の技術】水を貯蔵したタンクや給水用配管の損傷による水漏れ、トンネルや建築物の防水処理の破損によって起こる水漏れは早期に発見しなければならない。水漏れは、一般的に水分の漏洩を目視で調べることによって発見されるが、目視によると微量の水分では見落とすことがあったり、漏洩が止まって乾燥したときには発見できないという問題があった。このため目視に頼らずに簡単に水漏れを検知できる手段が求められていた。従来の水漏れを検知するものとして、例えば特開平５－７２１９４号公報、特開平６－２０２５６０号公報および特開平７－５５７８８号公報には、水分と反応して変色する物質を基材に担持させたインジケータが開示されてい

[Claim(s)]

[Claim 1] It can provide coloration layer in one surface of water permeability film, water detection label which designates that it is something which melts theresin of at least one kind where said coloration layer consists of water soluble dye 0.00 1 to 5 weight% and theink vehicle, said ink vehicle cellulosic resin, acrylic resin, polyester resin, polyamide resin, silicone resin and polyacetal resin, is chosen from midst of polyurethane resin, epoxy resin and petroleum type resin in solvent as feature.

[Claim2] It can provide coloration layer in one surface of water permeability film, said coloration layer consistsof water soluble dye 0.00 1 to 5 weight% and ink vehicle, moisture detection label which designatesthat transparent waterproof layer is provided in surface as feature.

[Claim3] Aforementioned coloration layer water detection label which is stated inthe Claim 1 or Claim2 which designates that 70 wt% or less it contains hiding property powder asfeature.

[Description of the Invention]

[0001]

[Technological Field of Invention] This invention is something regarding water detection label in order todetect leak of water.

[0002]

[Prior Art] You must discover water leak which happens with breakage of water repellent treatmentof water leak, tunnel and construction due to damage of tankand pipe for water supplying which store water in early stage. water leak is discovered by generally inspecting leak of moisturewith visual, but according to visual with moisture of trace amountthere is a thing which is overlooked, leak stops and when drying,there was a problem that cannot discover. Because of this without depending on visual, means which candetect water leak simply was sought. Reacting with moisture, indicator which bears substance which changescolor in substrate is disclosed in for example Japan Unexamined Patent Publication Hei 5 - 72194 disclosure,

る。

【０００３】

【発明が解決しようとする課題】しかしながら、これらのインジケータは水分を検知しても変色部分が小さくて不明瞭なことがあったり、表面からの水分の付着や湿度の高い環境で使用した時に結露を生じると変色してしまって検知不可能になることがあった。

【０００４】本発明は前記の課題を解決するためになされたもので、水分を検知すると明瞭に変色し、変色後は乾燥しても元の色に戻らず、湿度の高い環境で使用しても表面からの水分の付着や結露により変色することがない水分検知ラベルを提供することを目的とする。

【０００５】

【課題を解決するための手段】前記の目的を達成するためになされた本発明の水分検知ラベルは、図１に示すように、透水性フィルム１の片面に発色層２が設けられ、発色層２が水溶性染料０．００１～５重量%およびインキビヒクルからなり、該インキビヒクルがセルロース系樹脂、アクリル系樹脂、ポリエステル系樹脂、ポリアミド系樹脂、シリコーン系樹脂、ポリアセタール系樹脂、ポリウレタン系樹脂、エポキシ系樹脂、石油系樹脂、の中から選ばれる少なくとも一種類の樹脂を溶剤に溶解したものである。

【０００６】前記溶剤はベンゼン、トルエン、キシレンの芳香族炭化水素類、ヘキサン、シクロヘキサン、オクタンの飽和炭化水素類、アセトン、メチルエチルケトン、シクロヘキサノンのケトン類、クロロホルム、トリクロロエタンのハロゲン化炭化水素類、ミネラルスピリット、石油エーテルの石油系溶剤の中から選ばれる少なくとも一種類であることが好ましい。前記インキビヒクルは市販インキメジウムであっても良い。

【０００７】水溶性染料の量が０．００１重量%未満では発色層２の変色後の色濃度が薄く、５重量%を越えると変色前の色が濃くなり、変色前と変色後との色差が小さいため判別が困難になってしまう。

【０００８】前記の目的を達成するためになされた本発明の水分検知ラベルは、図２に示すように、透水性フィルム１の片面に発色層２が設けられ、発色層２が水溶性

Japan Unexamined Patent Publication Hei 6 - 202560 disclosure and Japan Unexamined Patent Publication Hei 7 - 55788 disclosure as detects conventional water leak.

[0003]

[Problems to be Solved by the Invention] But, as for these indic ator detecting water, strange colored part amountbeing small, there is a indistinct thing, when using with environment whosedeposit and humidity of water from surface are high, when thedew condensation is caused, changing color, there was a thing which becomes thedetection impossible.

[0004] As for this invention being something which can be don e in order to solvethe aforementioned problem, when it detects water, it changes colorclearly, after color change even when drying, using with environmentwhere humidity is high not to return to original color, it designatesthat it offers water detection label which does not have factthat it changes color with deposit and dew condensation of water fromthe surface as objective.

[0005]

[Means to Solve the Problems] Can be done in order to achieve aforementioned object as for thewater detection label of this invention which, As shown in Figure 1, it can provide coloration layer 2 in one surface of the water permeability film 1, coloration layer 2 consists of water soluble dye 0.00 1 to 5 weight% and ink vehicle, said ink vehicle thecellulosic resin , acrylic resin , polyester resin , polyamide resin , silicone resin and polyacetal resin ,the polyurethane resin , epoxy resin and petroleum type resin , is something which melts resinof at least one kind which are chosen from in in solvent.

[0006] Aforementioned solvent aromatic hydrocarbons of ben zene , toluene and the xylene, saturated hydrocarbon of hexane , cyclohexane and octane, ketones ofthe acetone , methylethylketone and cyclohexanone, halogenated hydrocarbons of chloroform and the trichloroethane, being at least one kind which are chosen from midst of petroleum solvent of the mineral spirits and petroleum ether is desirable. Aforementioned ink vehicle is good being marketing ink medium.

[0007] Quantity of water soluble dye under 0.00 1 wt% color co ncentration after changingcolor of coloration layer 2 becomes thin, when it exceeds 5 weight%, colorbefore changing color dense, before changing color and because thechrominance after changing color is small, distinction becomes difficult.

[0008] As for moisture detection label of this invention which can be done inorder to achieve aforementioned objective, as shown in Figure 2, itcan provide coloration layer 2 in one

染料０．００１～５重量%およびインキビヒクルからなり、表面に透明防水層３が設けられている。透明防水層３は、水分検知ラベルの表面からの水分の付着や結露による水分に対する防水性を向上させる。

surface of water permeability film 1, coloration layer 2 consists ofthe water soluble dye 0.00 1 to 5 weight % and ink vehicle, transparent waterproof layer 3 is provided in surface. transparent waterproof layer 3 improves water repellancy for moisture due to deposit and thedew condensation of moisture from surface of moisture detection label.

【０００９】発色層２は、隠蔽性粉体を７０重量%以下含有することが好ましい。隠蔽性粉体の量が７０重量%を越えると、発色層２の透水性フィルム１への塗布性が悪くなる。

[0009] As for coloration layer 2, 70 wt% or less it is desirable t o contain hiding property powder. When quantity of hiding property powder exceeds 70 wt%, coating property to thewater permeability film 1 of coloration layer 2 becomes bad.

【００１０】透水性フィルム１は水分を速やかに吸収、透過し、濡れても十分な強度を有するものであれば良く、紙や不織布が挙げられる。

[0010] If water permeability film 1 water rapidly to absorb and t ransmit, getting wet, itis something which possesses sufficient strength, it is good, can list paperand nonfiber cloth.

【００１１】前記水溶性染料は、カヤノールレッド ＮＢＲ、ブリリアントスカーレット３Ｂ、アシッドファストオレンジ ＳＧ、アマランス、アシッドローダミン Ｂ、エオシン Ｇ、アシッドミリングレッド ＲＳ、アリザリンダイレクトブルーＡＧＧ、インジゴカルミンブルー Ｇ、アシッドミリングシアニン ５Ｒの酸性染料、アイゼンカチオンレッド ７ＢＮＨ、カチオンレッド ６Ｂ、カチオンピンク ＦＧ、クリスタルバイオレット、メチレンブルー Ｂの塩基性染料、カヤノールライトレッド Ｆ５Ｂ、ダイレクトファストスカーレット ４ＢＳ、ベンゾパープリン ４Ｂ、ダイレクトファストオレンジ Ｓ、ダイレクトロージュリンレッド Ｂ、クロランチファストレッド ６ＢＬＬ、シリアスレッド ４Ｂ、シリアススプラレッドバイオレット ＲＬ、シリアススプラバイオレット ＢＬ、ダイレクトスカイブルー ５Ｂの直接染料、クロムオレンジ Ａ、クロムオレンジ ＧＲ、クロムレッド Ｂ、クロムブリリアントレッド Ｂ、クロムブリリアントバイオレット Ｒ、クロムブラウン ＰＧの酸性媒染染料、スミフィックスブリリアントレッドＧスペシャル、リアクトンレッド ２Ｂ－Ｆ、プロシオンルビン ＢＳ、シバクロンバイオレット Ｆ２Ｒ－Ａ、プロシオンブリリアントブルー ＲＳの反応染料、食品用赤色２号、食品用赤色３号、食品用赤色４号、食品用赤色１０２号、食品用赤色１０３号、食品用赤色１０４号、食品用赤色１０５号、食品用赤色１０６号の食品用色素の中から選ばれる少なくとも一種類であることが好ましい。

[0011] As for aforementioned water soluble dye, Kayanol red NBR, brilliant scarlet 3B, acid fast orange SG, amaranth, acid Rhodamine B, eosin G, acid milling red RS, alizarin direct blue AGG, indigo carmine blue G, acidic dye of acid milling cyanine 5R, Aizen cation red 7BNH, cation red 6B, cation pink FG, Crystal Violet, basic dye of methylene blue B, Kayanol write red F5B, direct fast scarlet 4BS, benzo per purine 4B, direct fast orange S, direct low di ゆ phosphorus red B, Clo run jp8 fast red 6BLL, Ti rear thread 4B, Ti rear soot プラ red violet RL, Ti rear soot プ mule I my つ jp7 BL, direct dye of direct sky blue 5B, chrome dye of chromium orange A, chromium orange GR, chromium red B,the chromium brilliant red B, chromium brilliant violet R and chromium brown PG, スミ fix brilliant red G special, rear クton red 2B - F, professional Aster tataricus L. ruby BS and grass clone violet F2R - A, reactive dye of professional Aster tataricus L. brilliant blue RS, itis desirable to be at least one kind which are chosen from midst of food dyeof food use red color 2 number, food use red color 3 number, food use red color 4 number, food use red color 102number, food use red color 103 number, food use red color 104 number, food use red color 105 number and the food use red color 106 number.

【００１２】透明防水層３は、ポリエチレン、ポリスチレン、ポリプロピレン、ポリ塩化ビニル、ポリフッ化ビニル、セロファンのフィルム、シリコーン系樹脂、ポリアミド系樹脂、セルロース系樹脂、アクリル系樹脂、エポキシ系樹脂、合成ゴムのワニスの中から選ばれる少なくとも一種類からなることが好ましい。

[0012] As for transparent waterproof layer 3, film of polyeth ylene, polystyrene, polypropylene, the polyvinyl chloride, polyvinyl fluoride and cellophane, it is desirable to consist of theat least one kind which are chosen from midst of varnish of silicone resin, the polyamide resin, cellulosic resin, acrylic resin, epoxy resin and synthetic rubber.

【００１３】前記隠蔽性粉体は、変色前の水溶性染料の色を隠蔽し、変色時の染色性および変色後の色保持性を向上させるためもので、炭酸マグネシウム、炭酸カルシ

[0013] Color of water soluble dye before changing color hiding i t does theaforementioned hiding property powder, it is desirable to be a dyeing behavior when changingcolor and at least one

ウム、炭酸バリウム、水酸化マグネシウム、酸化マグネシウム、酸化カルシウム、酸化チタン、ケイ酸、ケイ酸マグネシウム、ケイ酸アルミニウム、酸性白土、カオリン、ベントナイト、セリサイトの中から選ばれる少なくとも一種類であることが好ましい。

kind which in order to improve, with thing, are chosenthe color retention after changing color from midst of magnesium carbonate , the calcium carbonate , barium carbonate , magnesium hydroxide , magnesium oxide , calcium oxide , titanium dioxide , the silicic acid , magnesium silicate , aluminum silicate , acidic clay , kaolin , bentonite and the sericite.

【００１４】発色層２は発色を阻害しない増量剤、増粘剤、分散剤、色調調整剤、安定剤、酸化防止剤等を含有していても良い。

[0014] Coloration layer 2 is good containing extender , thicke ner , dispersant , the color adjustment agent , stabilizer and antioxidant etc which do not obstruct coloration.

【００１５】さらに本発明のラベルを使用箇所に固定するために、図３に示すように、透水性フィルム１の裏面、周辺部等に粘着層４を設け、粘着層４に剥離紙５を設けて、水分検知ラベルの使用時に剥離紙５を剥がして貼り付けるようにしても良い。

[0015] Furthermore as in order to lock label of this invention i n use site,shown in Figure 3, providing adhesive layer 4 in back surface and periphery etcof water permeability film 1, providing release paper 5 in adhesive layer 4, peeling release paper 5 whenusing water detection label to stick it is good.

【００１６】水分検知ラベルは以下のようにして製造する。まず水溶性染料、隠蔽性粉体およびインキビヒクルのインキ成分をボールミル、三本ロール、撹拌機、らいかい機、サンドミル、分散機などを使用し分散、混練することによってインキ化する。得られたインキをスクリーン印刷、グラビア印刷、オフセット印刷、コーティング、スプレーによる吹き付けなどの方法で透水性フィルム１に塗布して発色層２を形成し水分検知ラベルを製造する。水分検知ラベルに透明防水層３を設ける際には、防水層成分がフィルムの場合にはドライラミネート、押し出しラミネート、ヒートラミネートなどによってラミネート加工し、防水層成分がワニスの場合には印刷、スプレー、刷毛塗り、ポッティングロールコート、ナイフコート、エアナイフコートなどによってオーバーコートする。

[0016] It produces moisture detection label like below. First in k component of water soluble dye , hiding property powder and ink vehicle you use theball mill , triple roll , mixer , agate machine , sand mill and dispersing machine andetc making ink you do dispersion and by kneading. ink which is acquired applying to water permeability film 1 with theblowing or other method due to screen printing , gravure printing , offset printing , coating andthe spray, it forms coloration layer 2 and produces moisture detection label. Case where transparent waterproof layer 3 is provided in moisture detection label,when waterproof layer component is film, laminate fabrication it does with dry laminate , the extruded laminate and heat laminating etc when waterproof layer component is varnish, overcoatit does with printing, spray , brush coating , potting roll coating , knife coating andthe air knife coating etc.

【００１７】水分検知ラベルは、タンクや配管等に設置し、水漏れがあると透水性フィルム１を水分が透過し、水分が発色層２に達すると発色層２中に水分が浸透し水溶性染料が溶解して透水性フィルム１および隠蔽性粉体が染色される。したがって染色状態が保持されるので色が元に戻ることがない。また表面からの水分の付着や結露等によって表面に水分が付着しても、その水分は発色層２に浸透しないため変色することがない。

[0017] When it installs moisture detection label, in tank, and t hepipe etc there is a water leak moisture transmits water permeability film 1, when the moisture reaches to coloration layer 2, moisture permeates in coloration layer 2 and thewater soluble dye melts and water permeability film 1 and hiding property powder are dyed. Therefore because dyeing color status is kept, there are not times whencolor returns to origin. In addition moisture depositing in surface with deposit and thedew condensation etc of moisture from surface, as for moisture because itdoes not permeate to coloration layer 2, there are not times when it changescolor.

【００１８】

[0018]

【発明の効果】本発明の水分検知ラベルは、水分を検知すると明瞭に変色し、乾燥しても元の色に戻らず、しかも表面に水分が付着しても変色しない。このためタンクや給水用配管などの漏水個所、トンネルや建築物などの防水個所の破損を簡単で確実に発見することができる。

[Effects of the Invention] Moisture detection label of this inve ntion changes color dries and doesnot change color, when moisture is detected, clearly, alsofurthermore moisture depositing in surface not to return to originalcolor. Because of this tank and pipe or other leaking water site for water supplying, being simple,you can discover breakage of tunnel

【００１９】

【実施例】以下、本発明の実施例を詳細に説明する。実施例１～１３は本発明を適用する発色層が設けられた水分検知ラベルを示す例であり、比較例１～３は本発明を適用外のラベルを示す例である。

【００２０】実施例１

水溶性染料として食品用赤色４号（三栄化学工業(株)製）１重量%、インキビヒクルとしてエチルセルロース（エトセル：ダウケミカル社製）の樹脂９重量%をキシレンの溶剤９０重量%に溶解したものを、らいかい機で混練して発色用インキを得た。このインキを濾紙（Ｎｏ．４：アドバンテック東洋(株)製）にスクリーン印刷し、淡赤色の水分検知ラベルを製造した。

【００２１】このラベルの変色試験を行った。ラベルの裏面から水を０．０１ｍｌ滴下して水分を付着させ、色の変化および変色部分の面積を測定した後、５０℃で２４時間乾燥し色の変化を観察した。次にラベルの表面から水を１０ｍｌ滴下して水分を付着させ色の変化を観察した。それらの結果を表１に示す。

【００２２】

and construction or other waterproofing site securely.

[0019]

[Working Example(s)] Below, Working Example of this invention is explained in detail. As for Working Example 1 to 13 it is an example which shows water detectionlabel where it can provide coloration layer which applies this invention, the Comparative Example 1 to 3 this invention is example which shows label outsideapplication.

[0020] Working Example 1

As water soluble dye kneading those which melt resin 9 weight% of ethyl cellulose (Ethocel : Dow Chemical Co. make) inthe solvent 90 weight% of xylene food use red color 4 number (Sanei Kasei Kogyo K.K. (DB 70-266-8518) make) 1 wt%, as ink vehicle, withthe agate machine, it acquired ink for coloration. This ink screen printing was done in filter paper (No.4: Advantec Toyo Kabushiki Kaisha make), water detectionlabel of light red color was produced.

[0021] Discoloration test of this label was done. 0.01 ml dripping water from back surface of label, depositing,change of color and after measuring surface area of strange colored part amount, the 2 4 hours it dried moisture with 50 °C and observed change ofcolor. 10 ml dripping water next from surface of label, themoisture depositing, you observed change of color. Those results are shown in Table 1.

[0022]

【表１】

[Table 1]

表　1

		水分付着前の色	裏面			表面		
			水分付着後の色	変色面積 (cm^2)	乾燥後の色	水分付着後の色	変色面積 (cm^2)	乾燥後の色
実施例	1	淡赤色	赤色	1．5	赤色	淡赤色	－	－
	2	白色	赤色	1．5	赤色	白色	－	－
	3	白色	淡赤色	1．5	淡赤色	白色	－	－
	4	白桃色	赤色	1．5	赤色	白桃色	－	－
	5	白色	赤色	1．5	赤色	白色	－	－
	6	白色	赤色	1．5	赤色	白色	－	－
	7	白色	赤色	1．5	赤色	白色	－	－
	8	白色	赤色	1．5	赤色	白色	－	－
	9	白色	赤色	1．5	赤色	白色	－	－
	１０	白色	赤色	1．5	赤色	白色	－	－
	１１	白色	赤色	1．5	赤色	白色	－	－
	１２	白色	赤色	1．5	赤色	白色	－	－
	１３	白色	赤色	1．5	赤色	白色	－	－
比較例	1	白色	灰色	2．5	白色	灰色	2．5	白色
	2	白色	赤色	1．5	赤色	赤色	1．5	赤色
	3	赤色	赤色	－	－	赤色	－	－

【００２３】同表に示すように、水分検知ラベルの裏面から水分を付着させたときは明瞭に変色して拡大表示され、乾燥しても元の色に戻ることはなかった。また表面から水分を付着させたときは、１週間放置しても変色しなかった。

[0023] As shown in same chart, water when depositing, changing colorclearly from back surface of water detection label, there was not athing where it is expanded is indicated, dries and returns to originalcolor. In addition water when depositing, 1 week leaving, it did notchange color, from surface.

【００２４】実施例２

水溶性染料として食品用赤色４号（三栄化学工業(株)製）０．１重量%、隠蔽性粉体としてケイ酸（AEROSIL 380：日本アエロジル(株)製）３０重量%、インキビヒクルとしてエチルセルロース（エトセル：ダウケミカル社製）の樹脂６重量%をキシレンの溶剤６３．９重量%に溶解したものを、らいかい機で混練して発色用インキを得た。このインキを濾紙（Ｎｏ．４：アドバンテック東洋(株)製）にスクリーン印刷し、白色の水分検知ラベルを製造した。

[0024] Working Example 2

As water soluble dye food use red color 4 number (San-ei Kasei Kogyo K.K. (DB 70-266-8518) make) 0.1 weight%, as hiding property powder kneading thosewhich melt resin 6 weight% of ethyl cellulose (Ethocel : Dow Chemical Co. make) in solvent 63.9 weight% of xylene thesilicic acid (AE ROS IL 380: Nippon Aerosil Co. Ltd. (DB 69-070-2188) make) 30 weight%, as ink vehicle, with agate machine, it acquired inkfor coloration. This ink screen printing was done in filter paper (No.4: Advantec Toyo Kabushiki Kaisha make), water detectionlabel of white was produced.

【００２５】このラベルの変色試験を実施例１と同様にして行い、その結果を表１に示す。同表に示すように、

[0025] It does discoloration test of this label shows result in Table 1 in thesame way as Working Example 1. As shown in same

水分検知ラベルの裏面から水分を付着させたときは明瞭に変色して拡大表示され、乾燥しても元の色に戻ることはなかった。また表面から水分を付着させたときは、１週間放置しても変色しなかった。

【００２６】実施例３

水溶性染料として食品用赤色４号（三栄化学工業(株)製）０．００１重量%、隠蔽性粉体としてケイ酸（AEROSIL 380：日本アエロジル(株)製）３０重量%、インキビヒクルとしてエチルセルロース（エトセル：ダウケミカル社製）の樹脂６重量%をキシレンの溶剤６３．９９９重量%に溶解したものを、らいかい機で混練して発色用インキを得た。このインキを濾紙（Ｎｏ．４：アドバンテック東洋(株)製）にスクリーン印刷し、白色の水分検知ラベルを製造した。

【００２７】このラベルの変色試験を実施例１と同様にして行い、その結果を表１に示す。同表に示すように、水分検知ラベルの裏面から水分を付着させたときは明瞭に変色して拡大表示され、乾燥しても元の色に戻ることはなかった。また表面から水分を付着させたときは、１週間放置しても変色しなかった。

【００２８】実施例４

水溶性染料として食品用赤色４号（三栄化学工業(株)製）５重量%、隠蔽性粉体としてケイ酸（AEROSIL 380：日本アエロジル(株)製）３０重量%、インキビヒクルとしてエチルセルロース（エトセル：ダウケミカル社製）の樹脂６重量%をキシレンの溶剤５９重量%に溶解したものを、らいかい機で混練して発色用インキを得た。このインキを濾紙（Ｎｏ．４：アドバンテック東洋(株)製）にスクリーン印刷し、白桃色の水分検知ラベルを製造した。

【００２９】このラベルの変色試験を実施例１と同様にして行い、その結果を表１に示す。同表に示すように、水分検知ラベルの裏面から水分を付着させたときは明瞭に変色して拡大表示され、乾燥しても元の色に戻ることはなかった。また表面から水分を付着させたときは、１週間放置しても変色しなかった。

【００３０】実施例５

水溶性染料としてアイゼンカチオンレッド　７ＢＮＨ（保土谷化学工業(株)製）の塩基性染料０．１重量%を使用したことを除き実施例２と同様にして白色の水分検知ラベルを製造した。

chart, moisture when depositing, changing colorclearly from back surface of moisture detection label, there was not athing where it is expanded is indicated, dries and returns to originalcolor. In addition moisture when depositing, 1 week leaving, it did notchange color, from surface.

[0026] Working Example 3

As water soluble dye food use red color 4 number (San-ei Kasei Kogyo K.K. (DB 70-266-8518) make) 0.00 1 wt% , as hiding property powder kneading thosewhich melt resin 6 weight% of ethyl cellulose (Ethocel : Dow Chemical Co. make) in solvent 63.999 weight% of xylene thesilicic acid (AE ROS IL 380: Nippon Aerosil Co. Ltd. (DB 69-070-2188) make) 30 weight% , as ink vehicle, with agate machine, it acquired inkfor coloration. This ink screen printing was done in filter paper (No.4: Advantec Toyo Kabushiki Kaisha make), water detectionlabel of white was produced.

[0027] It does discoloration test of this label shows result in Tab le 1 in thesame way as Working Example 1. As shown in same chart, moisture when depositing, changing colorclearly from back surface of moisture detection label, there was not athing where it is expanded is indicated, dries and returns to originalcolor. In addition moisture when depositing, 1 week leaving, it did notchange color, from surface.

[0028] Working Example 4

As water soluble dye food use red color 4 number (San-ei Kasei Kogyo K.K. (DB 70-266-8518) make) 5 weight% , as hiding property powder kneading thosewhich melt resin 6 weight% of ethyl cellulose (Ethocel : Dow Chemical Co. make) in solvent 59 weight% of xylene thesilicic acid (AE ROS IL 380: Nippon Aerosil Co. Ltd. (DB 69-070-2188) make) 30 weight% , as ink vehicle, with agate machine, it acquired inkfor coloration. This ink screen printing was done in filter paper (No.4: Advantec Toyo Kabushiki Kaisha make), water detectionlabel of white peach color was produced.

[0029] It does discoloration test of this label shows result in Tab le 1 in thesame way as Working Example 1. As shown in same chart, moisture when depositing, changing colorclearly from back surface of moisture detection label, there was not athing where it is expanded is indicated, dries and returns to originalcolor. In addition moisture when depositing, 1 week leaving, it did notchange color, from surface.

[0030] Working Example 5

Excluding fact that basic dye 0.1 weight% of Aizen cation red 7BNH (Hodogaya Chemical Co. Ltd. (DB 69-054-2287) make) is used as water soluble dyethe water detection label of white was produced to similar to theWorking Example 2.

【００３１】このラベルの変色試験を実施例１と同様にして行い、その結果を表１に示す。同表に示すように、水分検知ラベルの裏面から水分を付着させたときは明瞭に変色して拡大表示され、乾燥しても元の色に戻ることはなかった。また表面から水分を付着させたときは、１週間放置しても変色しなかった。

【００３２】実施例６

水溶性染料としてカヤノールレッド　ＮＢＲ（日本化薬(株)製）の酸性染料０．１重量%を使用したことを除き実施例２と同様にして白色の水分検知ラベルを製造した。

【００３３】このラベルの変色試験を実施例１と同様にして行い、その結果を表１に示す。同表に示すように、水分検知ラベルの裏面から水分を付着させたときは明瞭に変色して拡大表示され、乾燥しても元の色に戻ることはなかった。また表面から水分を付着させたときは、１週間放置しても変色しなかった。

【００３４】実施例７

水溶性染料としてカヤノールライトレッド　Ｆ５Ｂ（日本化薬(株)製）の直接染料０．１重量%を使用したことを除き実施例２と同様にして白色の水分検知ラベルを製造した。

【００３５】このラベルの変色試験を実施例１と同様にして行い、その結果を表１に示す。同表に示すように、水分検知ラベルの裏面から水分を付着させたときは明瞭に変色して拡大表示され、乾燥しても元の色に戻ることはなかった。また表面から水分を付着させたときは、１週間放置しても変色しなかった。

【００３６】実施例８

水溶性染料としてスミフィックスブリリアントレッドＧスペシャル（住友化学工業(株)製）の反応染料０．１重量%を使用したことを除き実施例２と同様にして白色の水分検知ラベルを製造した。

【００３７】このラベルの変色試験を実施例１と同様にして行い、その結果を表１に示す。同表に示すように、水分検知ラベルの裏面から水分を付着させたときは明瞭に変色して拡大表示され、乾燥しても元の色に戻ることはなかった。また表面から水分を付着させたときは、１週間放置しても変色しなかった。

[0031] It does discoloration test of this label shows result in Table 1 in thesame way as Working Example 1. As shown in same chart, moisture when depositing, changing colorclearly from back surface of moisture detection label, there was not athing where it is expanded is indicated, dries and returns to originalcolor. In addition moisture when depositing, 1 week leaving, it did notchange color, from surface.

[0032] Working Example 6

Excluding fact that acidic dye 0.1 weight% of Kayanol red NBR (Nippon Kayaku Co. Ltd. (DB 69-054-7468) make) is used as water soluble dyethe water detection label of white was produced to similar to theWorking Example 2.

[0033] It does discoloration test of this label shows result in Table 1 in thesame way as Working Example 1. As shown in same chart, moisture when depositing, changing colorclearly from back surface of moisture detection label, there was not athing where it is expanded is indicated, dries and returns to originalcolor. In addition moisture when depositing, 1 week leaving, it did notchange color, from surface.

[0034] Working Example 7

Excluding fact that direct dye 0.1 weight% of Kayanol write red F5B (Nippon Kayaku Co. Ltd. (DB 69-054-7468) make) is used as water soluble dyethe water detection label of white was produced to similar to theWorking Example 2.

[0035] It does discoloration test of this label shows result in Table 1 in thesame way as Working Example 1. As shown in same chart, moisture when depositing, changing colorclearly from back surface of moisture detection label, there was not athing where it is expanded is indicated, dries and returns to originalcolor. In addition moisture when depositing, 1 week leaving, it did notchange color, from surface.

[0036] Working Example 8

Excluding fact that reactive dye 0.1 weight% of スミ fix brilliant red G special (Sumitomo Chemical Co. Ltd. (DB 69-053-5307) make) is used as thewater soluble dye water detection label of white was produced to similarto Working Example 2.

[0037] It does discoloration test of this label shows result in Table 1 in thesame way as Working Example 1. As shown in same chart, moisture when depositing, changing colorclearly from back surface of moisture detection label, there was not athing where it is expanded is indicated, dries and returns to originalcolor. In addition moisture when depositing, 1 week leaving, it did notchange color, from surface.

【００３８】実施例９

インキビヒクルとして市販のインキメジウム（ＰＡＳ－８００メジウム：十條化工(株)製）６９．９重量%を使用したことを除き実施例２と同様にして白色の水分検知ラベルを製造した。

【００３９】このラベルの変色試験を実施例１と同様にして行い、その結果を表１に示す。同表に示すように、水分検知ラベルの裏面から水分を付着させたときは明瞭に変色して拡大表示され、乾燥しても元の色に戻ることはなかった。また表面から水分を付着させたときは、１週間放置しても変色しなかった。

【００４０】実施例１０

インキビヒクルとして市販のインキメジウム（テトロン９００メジウム：十條化工(株)製）６９．９重量%を使用したことを除き実施例２と同様にして白色の水分検知ラベルを製造した。

【００４１】このラベルの変色試験を実施例１と同様にして行い、その結果を表１に示す。同表に示すように、水分検知ラベルの裏面から水分を付着させたときは明瞭に変色して拡大表示され、乾燥しても元の色に戻ることはなかった。また表面から水分を付着させたときは、１週間放置しても変色しなかった。

【００４２】実施例１１

隠蔽性粉体として酸化チタン２０重量%、インキビヒクルとしてエチルセルロース（エトセル：ダウケミカル社製）の樹脂７重量%をキシレンの溶剤７２．９重量%に溶解したものを使用したことを除き実施例２と同様にして白色の水分検知ラベルを製造した。

【００４３】このラベルの変色試験を実施例１と同様にして行い、その結果を表１に示す。同表に示すように、水分検知ラベルの裏面から水分を付着させたときは明瞭に変色して拡大表示され、乾燥しても元の色に戻ることはなかった。また表面から水分を付着させたときは、１週間放置しても変色しなかった。

【００４４】実施例１２

隠蔽性粉体として炭酸カルシウム１０重量%、インキビヒクルとしてエチルセルロース（エトセル：ダウケミカル社製）の樹脂８重量%をキシレンの溶剤８１．９重量%に溶解したものを使用したことを除き実施例２と同様にして白色の水分検知ラベルを製造した。

[0038] Working Example 9

Excluding fact that commercial ink medium (PAS - 800 mediu m: 10 條 chemical engineering Ltd. make) 69.9 wt% is used as ink vehicle themoisture detection label of white was produced to similar to theWorking Example 2.

[0039] It does discoloration test of this label shows result in Tab le 1 in thesame way as Working Example 1. As shown in same chart, moisture when depositing, changing colorclearly from back surface of moisture detection label, there was not athing where it is expanded is indicated, dries and returns to originalcolor. In addition moisture when depositing, 1 week leaving, it did notchange color, from surface.

[0040] Working Example 10

Excluding fact that commercial ink medium (Tetoron 900 med ium: 10 條 chemical engineering Ltd. make) 69.9 wt% is used as ink vehicle themoisture detection label of white was produced to similar to theWorking Example 2.

[0041] It does discoloration test of this label shows result in Tab le 1 in thesame way as Working Example 1. As shown in same chart, moisture when depositing, changing colorclearly from back surface of moisture detection label, there was not athing where it is expanded is indicated, dries and returns to originalcolor. In addition moisture when depositing, 1 week leaving, it did notchange color, from surface.

[0042] Working Example 11

As hiding property powder excluding fact that those which melt resin 7 weight% of theethyl cellulose (Ethocel : Dow Chemical Co. make) in solvent 72.9 weight% of xylene as titanium dioxide 20 weight% and ink vehicle are usedthe water detection label of white was produced to similar to theWorking Example 2.

[0043] It does discoloration test of this label shows result in Tab le 1 in thesame way as Working Example 1. As shown in same chart, moisture when depositing, changing colorclearly from back surface of moisture detection label, there was not athing where it is expanded is indicated, dries and returns to originalcolor. In addition moisture when depositing, 1 week leaving, it did notchange color, from surface.

[0044] Working Example 12

As hiding property powder excluding fact that those which melt resin 8 weight% of theethyl cellulose (Ethocel : Dow Chemical Co. make) in solvent 81.9 weight% of xylene as calcium carbonate 10 weight% and ink vehicle are usedthe water detection label of white was produced to similar to theWorking

【００４５】このラベルの変色試験を実施例１と同様にして行い、その結果を表１に示す。同表に示すように、水分検知ラベルの裏面から水分を付着させたときは明瞭に変色して拡大表示され、乾燥しても元の色に戻ることはなかった。また表面から水分を付着させたときは、１週間放置しても変色しなかった。

【００４６】実施例１３

実施例２で製造した水分検知ラベルの表面にポリフッ化ビニルフィルム（テドラー：デュポン社製、厚さ２５μｍ）をドライラミネートし、透明防水層を有する水分検知ラベルを得た。

【００４７】このラベルの変色試験を実施例１と同様にして行い、その結果を表１に示す。同表に示すように、水分検知ラベルの裏面から水分を付着させたときは明瞭に変色して拡大表示され、乾燥しても元の色に戻ることはなかった。また表面から水分を付着させたときは、１週間放置しても変色しなかった。

【００４８】比較例１

濾紙（Ｎｏ．４：アドバンテック東洋(株)製）の両面に、それぞれ水を０．０１ｍｌ滴下して水分を付着させ、色の変化および変色部分の面積を測定した後、１０分間放置して乾燥し色の変化を観察した。それらの結果を表１に示す。同表に示すように、両面とも水分を付着させると変色が拡大表示され、乾燥するとすぐに元の色に戻った。

【００４９】比較例２

水溶性染料として食品用赤色４号（三栄化学工業(株)製）２重量%、隠蔽性粉体としてケイ酸（AEROSIL 380：日本アエロジル(株)製）９８重量%を、濾紙（Ｎｏ．４：アドバンテック東洋(株)製）に直接塗布し、白色の水分検知ラベルを製造した。

【００５０】このラベルの裏面と表面に、それぞれ水を０．０１ｍｌ滴下して水分を付着させ、色の変化および変色部分の面積を測定した後、５０℃で２４時間乾燥し色の変化を観察した。それらの結果を表１に示す。同表に示すように、水分検知ラベルの裏面から水分を付着させたときは変色が拡大表示され、乾燥しても元の色に戻

Example 2.

[0045] It does discoloration test of this label shows result in Tab le 1 in thesame way as Working Example 1. As shown in same chart, moisture when depositing, changing colorclearly from back surface of moisture detection label, there was not athing where it is expanded is indicated, dries and returns to originalcolor. In addition moisture when depositing, 1 week leaving, it did notchange color, from surface.

[0046] Working Example 13

Polyvinyl fluoride film (Tedlar : Dupont Co. make and thickn ess 25 m) dry laminate was done in surface of moisture detectionlabel which is produced with Working Example 2, moisture detection labelwhich possesses transparent waterproof layer was acquired.

[0047] It does discoloration test of this label shows result in Tab le 1 in thesame way as Working Example 1. As shown in same chart, moisture when depositing, changing colorclearly from back surface of moisture detection label, there was not athing where it is expanded is indicated, dries and returns to originalcolor. In addition moisture when depositing, 1 week leaving, it did notchange color, from surface.

[0048] Comparative Example 1

Filter paper (No.4: Advantec Toyo Kabushiki Kaisha make) in both sides, 0.01 ml dripping respective water,the water depositing, change of color and after measuring surface area ofstrange colored part amount, 10 min leaving, it dried and observed thechange of color. Those results are shown in Table 1. As shown in same chart, when also both sides when it deposits,color change is expanded is indicated water, dries it returned tooriginal color immediately.

[0049] Comparative Example 2

As water soluble dye silicic acid (AE ROS IL 380: Nippon Aeros il Co. Ltd. (DB 69-070-2188) make) 98 weight %, was directly applied to filter paper (No.4: Advantec Toyo Kabushiki Kaisha make)the food use red color 4 number (San-ei Kasei Kogyo K.K. (DB 70-266-8518) make) 2 wt%, as hiding property powder, water detection label ofthe white was produced.

[0050] In back surface and surface of this label, 0.01 ml drippin g therespective water, depositing, change of color and after measuring thesurface area of strange colored part amount, 2 4 hours it dried moisture with the50 °C and observed change of color. Those results are shown in Table 1. As shown in same chart, there was not a thing where whendepositing, color change

ることはなかった。また表面から水分を付着させたときも変色が拡大表示され、染料が濾紙を染色したため乾燥しても元の色に戻ることはなかった。

【００５１】比較例３

水溶性染料として食品用赤色４号（三栄化学工業(株)製）６重量%、インキビヒクルとしてエチルセルロース（エトセル：ダウケミカル社製）の樹脂９重量%をキシレンの溶剤８５重量%に溶解したものを、らいかい機で混練して発色用インキを得た。このインキを濾紙（Ｎｏ．４：アドバンテック東洋(株)製）にスクリーン印刷し、赤色の水分検知ラベルを製造した。

【００５２】このラベルの変色試験を実施例１と同様にして行い、その結果を表１に示す。同表に示すように、水分検知ラベルの裏面から水分を付着させても、表面から付着させても変色を判別することができなかった。

【図面の簡単な説明】

【図１】本発明を適用する水分検知ラベルの実施例を示す断面図である。

【図２】本発明を適用する水分検知ラベルの別の実施例を示す断面図である。

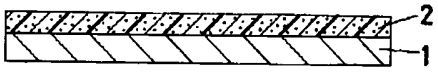
【図３】本発明を適用する水分検知ラベルの別の実施例を示す断面図である。

【符号の説明】

１は透水性フィルム、２は発色層、３は透明防水層、４は粘着層、５は剥離紙である。

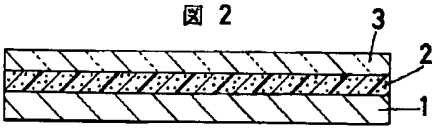
【図１】

図 1



【図２】

図 2



is expanded is indicated moisture from theback surface of moisture detection label, dries and returns to original color. In addition because when depositing, color change is expanded isindicated moisture from surface, dye dyes filter paper, drying, there was not a thing which returns to original color.

[0051] Comparative Example 3

As water soluble dye kneading those which melt resin 9 weight% of ethyl cellulose (Ethocel : Dow Chemical Co. make) inthe solvent 85 weight% of xylene food use red color 4 number (Sanei Kasei Kogyo K.K. (DB 70-266-8518) make) 6 weight% , as ink vehicle, withthe agate machine, it acquired ink for coloration. This ink screen printing was done in filter paper (No.4: Advantec Toyo Kabushiki Kaisha make), water detectionlabel of red color was produced.

[0052] It does discoloration test of this label shows result in Table 1 in thesame way as Working Example 1. As shown in same chart, from back surface of moisture detectionlabel moisture depositing even when, depositing from surface, itwas not possible to distinguish color change.

[Brief Explanation of the Drawing(s)]

[Figure 1] It is a cross section which shows Working Example of water detection label whichapplies this invention.

[Figure 2] It is a cross section which shows another Working Example of water detection labelwhich applies this invention.

[Figure 3] It is a cross section which shows another Working Example of water detection labelwhich applies this invention.

[Explanation of Reference Signs in Drawings]

As for 1 as for water permeability film and 2 as for coloration layer andthe 3 as for transparent waterproof layer and 4 as for adhesive layer and the5 it is a release paper.

[Figure 1]

[Figure 2]

【図３】

[Figure 3]

図 3